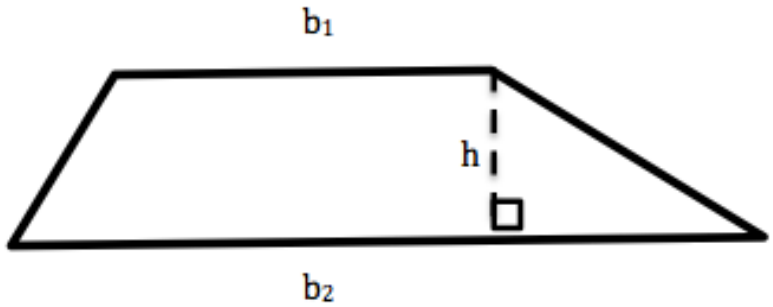
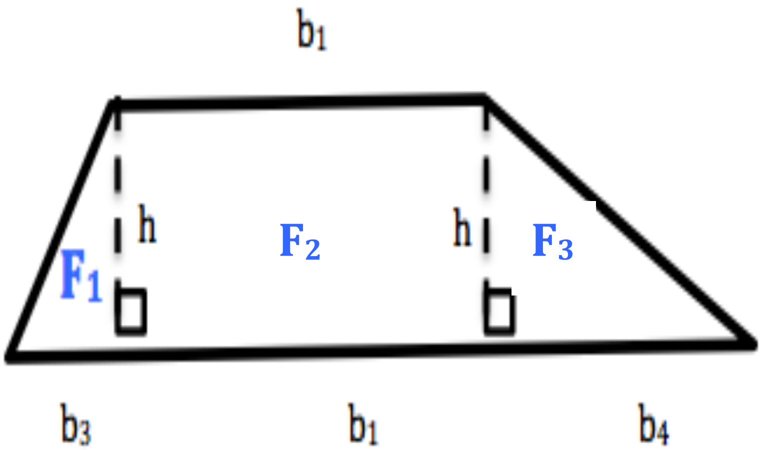
$$A = \frac{1}{2}h(b_1 + b_2)$$




## Given

$$A_T = \frac{1}{2}h(b_1 + b_2)$$




$A_T = Area\ of\ Trapezoid$
$F_1 = Area\ of\ Figure\ 1\ (Triangle)$
$F_2 = Area\ of\ Figure\ 2\ (Rectangle)$
$F_3 = Area\ of\ Figure\ 3\ (Triangle)$

| Deriving the Formula for the Area of a Trapezoid | |
|---|---|
| STEPS | REASONS |
| $A_T = F_1 + F_2 + F_3$ | Decomposition of a geometric shape |
| $A_T = \left(\frac{1}{2}hb_3\right) + (hb_1) + \left(\frac{1}{2}hb_4\right)$ | Substituting the formulas for the area of a triangle and rectangle for each shape. |
| $A_T = (hb_1) + \left(\frac{1}{2}hb_3\right) + \left(\frac{1}{2}hb_4\right)$ | Rewriting using the Commutative Propety of Addition. |
| $A_T = h\left(b_1 + \frac{1}{2}b_3 + \frac{1}{2}b_4\right)$ | Rewrite by factoring out the commom factor "h" from each term. |
| $A_T = h\left(\frac{2}{2}b_1 + \frac{1}{2}b_3 + \frac{1}{2}b_4\right)$ | Rewrite with common demoninators. |
| $A_T = h\left(\frac{2b_1 + b_3 + b_4}{2}\right)$ | Rewrite by adding the fractions. |
| $A_T = h\left(\frac{b_1 + b_1 + b_3 + b_4}{2}\right)$ | Rewrite by decomposing $2b_1$ into $b_1 + b_2$ |
| $A_T = h\left(\frac{b_1 + b_2}{2}\right)$ | Substitution<br>*Note*: $b_2 = b_1 + b_3 + b_4$ |
| $A_T = \frac{1}{2}h(b_1 + b_2)$ | Rewriting using the concept that dividing by 2 is equivalent to multipying by ½. |